

ABSTRACT OF THE DISCLOSURE

A method for measuring low levels of a substance in a sample includes the formation of a rotor from paramagnetic particles in a substantially uniform magnetic field. The rotor is rotated by rotating the substantially uniform magnetic field. A portion of the substance in a sample is bound to the paramagnetic particles, and a signal having a time-varying component is detected. The signal is then processed using a lock-in amplifier with a reference signal having a frequency twice that of the rotation of the magnetic field. This improves the signal-to-noise ratio of the time-varying component of the signal.